REMARKS

Claim 9 is amended to recite an isolated *Lawsonia intracellularis* outer membrane protein, wherein that protein is immunoreactive with antisera to SEQ.ID.NO:2 and has a molecular weight of about 37 kD.

Claims 19, 20, 21 are amended for formal matters to replace the "characterized" language. It is believed these amendments in no way introduce a limitation and are not made for purposes of patentability.

In the final Office Action issued February 18, 2004, the Examiner rejected claims 9, 13, 18-21 and 38 under 35 U.S.C. 112, first paragraph, for containing subject matter not described in the specification. The Examiner has objected to including fragments of the isolated Lawsonia intracellularis outer membrane protein. The Examiner has also objected that the specification does not teach an isolated homologous Lawsonia intracellularis outer membrane protein or immunogenic compositions comprising such that are immunoreactive with antisera to SEQ.ID.No:2. The Examiner objected that the specification does not teach the structure or relevant identifying characteristics of a representative number of SEQ.ID.NO:2 variants or fragments

sufficient to allow one skilled in the art to determine that the inventor had possession of the invention as claimed.

It is respectfully submitted that the Examiner has read claim 9 too broadly. Even prior to the present amendment, the claim was directed to an isolated Lawsonia intracellularis outer membrane protein, and that protein has the specific characteristics of being immunoreactive with the antisera to SEQ.ID.NO:2 and has the molecular weight of about 37kD. Also provided was the method for isolating such a protein from any Lawsonia intracellularis. There is, in fact, nothing left to experimentation. The ordinary skilled practitioner, after excising a 37kD band from Lawsonia intracellularis outer membrane material, need only react that protein with antisera to SEQ.ID.NO:2 to determine whether or not any isolated Lawsonia intracellularis outer membrane protein of 37kD is within the scope of the claims. Antisera to SEQ.ID.NO:2, of course, can be prepared by ordinary procedures as its sequence is given and antisera can be raised, for example in rabbits, as taught in Example 1, on page 21 of the specification. Isolating the organism and obtaining an outer membrane protein preparation, as well as

characterizing the antigenic properties of such outer membrane proteins, is described in Example 1, beginning on page 20.

Applicants, by their description of these steps for obtaining isolated Lawsonia intracellularis outer membrane protein material, preclude the need for any experimentation. From isolating the organism as a wild type, the present disclosure demonstrates that they had the full scope of the invention in hand. That is, any strain, following the teachings in the specification, could be isolated from diseased swine, the outer membrane protein preparation formulated, the 37kD sequence isolated and, after separately producing antisera to a SEQ.ID.NO:2 protein, and the wild type 37kD outer membrane protein tested to determine whether or not it is within the scope of the claimed invention. Applicants possessed the invention to the full scope of the present claims. This is a specific isolated protein of a specific size, obtained from a specific organism's outer membrane and having defined immunoreactive characteristics.

The Examiner has objected to claims 9, 13, 18-21 and 38 under 35 USC 112, first paragraph for lack of enablement,

particularly objecting to the homologous sequences or fragments of 37kD protein. It is believed that, with the present amendments to Claim 9, this objection is overcome.

It is believed that the homology language is not necessary to encompass the full scope of the claimed invention and it has, therefore, been deleted. Notwithstanding this, however, sequences having a given percentage homology to a specific sequence are permitted in claims, and in this case, are supported in the specification with the same percentage and functional characteristics as has been claimed.

The Examiner has objected to claims 9, 13, 18-21 and 38 under 35 USC 112, second paragraph, for being indefinite. Claim 9 is objected to for being vague for use of the term "immunogenic fragment." Claim 13 is objected to for being vague for using the term "homologous." Claims 19, 20 and 21 are objected to for using the phrase "characterized in that." Claim 20 is also objected to for the use of "antigen" without a clear antecedent basis.

The subjects of the above-mentioned objections have been removed with the present amendments.

Claims 18 and 38 are rejected for being vague in reciting "a protein."

The objections to claims 18 and 38 for reciting "a protein" are respectfully traversed. Both claims are dependent on claim 9, and claim 9 is directed to an isolated Lawsonia intracellularis outer membrane protein. This has to be the protein to which the dependent claims are directed.

Claims 9, 13, 18-21 and 38 stand rejected under 35 U.S.C. 102(b) for being anticipated by McOrist et al. The Examiner has relied on the McOrist et al for disclosing a Campylobacter-like organism isolated from homogenized intestinal tissue of three pigs and cultivated, from which a whole cell suspension was used to prepare an immunogen for raising monoclonal antibodies. Sonicated outer membrane preparations of the Campylobacter-like organism were separated by SDS-PAGE and immunoblotted using the monoclonal antibodies. The Examiner concluded that, because outer membrane proteins ranging from 25kD to 43kD were identified, referencing Figure 2, the immunoblott disclosed the presently claimed isolated Lawsonia intracellularis outer membrane protein having the molecular

weight of about 37kD, as the 25kD - 43kD range must contain the 37kD protein.

The rejection over McOrist et al is respectfully traversed. The claimed outer membrane protein having a molecular weight of about 37kD is neither anticipated nor rendered obvious by McOrist et al. On careful inspection, Figure 2 and the other figures presented in this publication show various isolated proteins for the Campylobacter-like organism, none of which is a 37kD band.

Figure 1 presents SDS-PAGE analysis of various Campylobacter outer membrane protein preparations and compares them with the Campylobacter-like organism outer membrane protein.

The RESULTS section on page 959 discusses this analysis. Specifically, in the paragraph bridging the first and second column on page 959, it is stated; "The protein profiles of the Campylobacter-like organism extracted from porcine proliferative enteropathy tissue were dominated by major protein bands of 55,000 and 70,000 molecular weight. Minor components were recognized between 20,000 and 43,000, including two distinct bands at 25,000 and 27,000. The

normal tissue sample (mucosa 204/79) had minor distinct components of 23,000 and 60,000." No band in the neighborhood of 37,000 was identified. Similarly, in Figure 2 on page 960, in an immunoblott analysis of rabbit antiserum the Campylobacter-like organism also yields the bands of 25,000 and 27,000, as well as about 43,000, in lanes 1 and 2. No 37,000 protein is revealed. The same result is illustrated in Figure 3, where monoclonal antibodies against the Campylobacter-like organism only showed 25,000 and 27,000 bands.

As the presently claimed isolated Lawsonia intracellularis outer membrane protein is required to have a molecular weight of 37kD, none of the proteins reported by McOrist et al could anticipate the present invention. Moreover, McOrist et al could not render the presently claimed protein obvious as it, in fact, teaches against the present invention. The ordinary skilled practitioner reviewing McOrist et al, and understanding that the Campylobacter-like organism is the organism now referred to as Lawsonia intracellularis, would conclude that outer membrane proteins would be found at 55 kD and 70kD, as well as 43kD, 25kD and 27kD. But, as the author's analysis makes no reference to a 37kD protein, and no 37kD protein is clearly

apparent in any of the figures, the teaching of McOrist et al would lead the ordinary practitioner away from concluding that a 37kD outer membrane protein would be found.

Claims 9, 13, 18-21 and 38 stand rejected under 35 U.S.C. 102(a) as being anticipated by Smith et al. Smith et al are said to disclose bacteria isolated from homogenized intestinal tissue, grown in cell culture, isolated, passaged and used to reproduce disease in experimentally inoculated pigs. The Examiner concluded the cell lysate obtained from isolated bacterial preparations reads on the present invention, as the cell lysate is concluded to comprise membrane proteins including immunogenic fragments of Lawsonia intracellularis outer membrane protein. The Examiner concluded that the use of the term "comprising" leaves the claims open to inclusion of unspecified ingredients, even in major amounts, and in the absence of evidence to the contrary the disclosed prior art cell lysate and the claimed proteins are the same.

The rejection for anticipation over Smith et al is respectfully traversed. The purpose of the Smith et al research was to examine the possible role IFN.gamma may

have in Lawsonia infection using an infection system in mice. To perform this experiment, bacteria were isolated from homogenized intestinal tissue and grown in cell culture. The bacteria were cultured to a final number of 11 passages, the cells in which the bacteria were grown were lysed, and bacterial suspensions were prepared. The bacterial suspension was used to inoculate the mice. Infection was monitored by postmortem examination of intestinal tissue. These procedures are summarized in the section MATERIALS AND METHODS on page 6738.

The reported study established that mice are susceptible to infection with Lawsonia intracellularis under the reported experimental conditions. This was done to develop a model to analyze the characteristics of intestinal hyperplasia caused by this bacterium. This reference does not teach the isolation of Lawsonia intracellularis proteins. They were the intestinal cells in which the bacterial were grown, not the bacteria, that were lysed. There is no disclosed Lawsonia intracellularis protein preparation, outer membrane protein preparation, or any specific outer membrane protein. Only whole viable bacteria used in the animal study are discussed. Accordingly, Smith et al discloses nothing regarding any Lawsonia intracellularis

outer membrane protein and can not render the presently claimed 37kD protein anticipated or obvious.

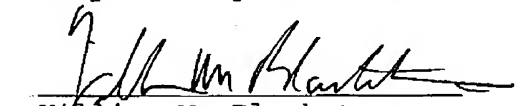
To summarize, the McOrist et al teach outer membrane proteins of a Campylobacter -like organism, but do not report a 37kD protein or anything close to it. Accordingly, if anything, McOrist et al teach against the present invention. Smith et al make no reference what so ever to isolated proteins of Lawsonia intracellularis, only to the whole organism. Accordingly, the present claims are neither obvious nor anticipated in view of the cited art.

In view of the above, it is respectfully submitted that Claims 9, 13, 18-21, and 38 are in condition for allowance. Favorable action is solicited. Should the Examiner consider that a conference would be helpful in advancing the prosecution of this application, the Examiner is invited to telephone applicants' attorney at the number below.

Applicants respectfully submit that because the claims are narrowed by deleting fragments, while the 37kD protein that has been the heart of the invention remains, it is believed that no additional searching or consideration is necessary

for examining the claims as now amended. It is respectfully requested that the present amendments be entered and considered, and this application be passed on to allowance.

Respectfully Submitted,



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